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Der Hakenkranz als Artkriterium bei Urceolariiden

Arch. Protistenkd. 136 (1988): 377-387

# Denticles as a Criterion of Species in Urceolariids (Ciliophora, Peritricha)[1]

by WALTER GUHL

with two illustrations

Summary

It is shown that the declaration of only one morphological detail (adhesive disc and denticles) is not sufficient as diagnosis of species in Urceolariids. Fresh water Trichodinids described in this manner are named with the given dates.

## Introduction

An important criterion of urceolariid species is the structure of the adhesive disc. The adhesive disc represents the bottom surface of the organism, where it attaches to the substrate. The adhesive or denticulate ring contains the hard parts, or denticles. Thus, HAIDER (1964) uses the appearance of the elements of the adhesive ring to differentiate the genera Urceolaria and Trichodinella from Trichodina, Vauchomia and Semitrichodina. However, these last three genera are differentiated from one another by different numbers of circlets of cilia. Meanwhile, some new trichodinid species have been described only on the basis of

[1] Dedicated to Prof. K.G. GRELL on the occasion of his seventy-fifth birthday.

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their body size and the type of denticulate rings. The present paper will consider, in light of published material, whether the description of only one morphological detail suffices to characterize a species.

## Results

Trichodina mutabilis KAZUBSKI 1968 occurs in various fishes. LOM (1970) differentiates by host species several modifications based on the denticulate rings. GRUPCHEVA et al. (1982) report only one type of ring for Trichodina mutabilis on various hosts (without giving measurements).

In the studies used, specimens of denticulate rings prepared with KLEIN's dry silver impregnation technique are reproduced photographically. Three denticles from each of these rings, enlarged to a uniform scale, are shown in Figure 1 (a-k).

When the constancy of the shape of the denticles of individuals was investigated, it was found that even adjacent denticles are not congruent (Figure 11 o, t, v), and those of two different individuals from the same host can differ very greatly (Figure 1 x, y). On the other hand, the denticles of different species can be nearly congruent, as some examples show:

--Denticles of the type described by GRUPCHEVA et al. (1982) correspond with those of Trichodina nigra subsp. siluri

according to LOM (1970) and those of Trichodina jiroveci according to GRUPCHEVA et al. (1982) (Figure 1 m, n).

--Denticles from a zooid found on Leucaspius according to LOM (1970) correspond very closely with those of Trichodina rostrata according to LOM (1970) (Figure 1 p), Trichodina modesta from Vimba vimba according to LOM (1970) (Figure 1 q, r) and Trichodina nigra nigra according to ARTHUR & LOM (1984) (Figure 1 s).

--Denticles of another zooid found on Leucaspius according to LOM (1970) resemble those of Trichodina nigra nigra according to GOLEMANSKI et al. (1982) (Figure 1 u).

--Denticles of a form found on carp according to LOM (1970) are practically impossible to differentiate from those of Trichodina nigra nigra according to LOM (1970) (Figure 1 w).

Then biometrical measurements were taken:

--The ratio of the outer circumference of the denticulate ring to the inner circumference: In all specimens of Trichodina mutabilis measured, this ratio was 2.9 ± 0.7 (R= 1.2). When differentiated by author and host species, the ratio varies from 2.7 (GRUPCHEVA et al. 1982) or 2.7 ± 0.6 (R= 1.1) (LOM 1970, Leucaspius) to 2.85 ± 0.05 (R= 0.1) (LOM 1970, Carassius) and 3.2 ± 0.5 (R= 1.0) (LOM 1970, carp). This ratio is 3.4 ± 0.7 (R= 1.25) in Trichodina nigra nigra, 3.4 in Trichodina nigra siluri, 2.9 ± 0.3 (R= 0.6) in Trichodina modesta, 2.8 in Trichodina rostrata, and 2.7 in Trichodina jiroveci. No differences can be established with this ratio,

especially if we consider that the ratio varies from 2.4 to 3.3 in Trichodina mutabilis from Leucaspis, and from 2.7 to 3.6 in the form from carp.

--Ratios of denticle measurements:

The length of the thorn was measured in proportion to that of the blade, the length of the blade in proportion to its width, and the total length in proportion to the length of the central part. Again, no differences were found (t-test with alpha= 0.05).

Also the measurements reported in the literature generally correspond, except that the dimensions of the denticles of Trichodina modesta are approximately half as large as those of Trichodina mutabilis, Trichodina nigra (nigra and siluri), Trichodina rostrata and Trichodina jiroveci.

Figure 1. Comparison of the shape of denticles of Trichodina mutabilis:

a. according to GRUPCHEVA et al. (1982).

b-k. according to LOM (1970), from different hosts: b-d from carp, e-f from Carassius auratus, g-k from Leucaspius delineatus

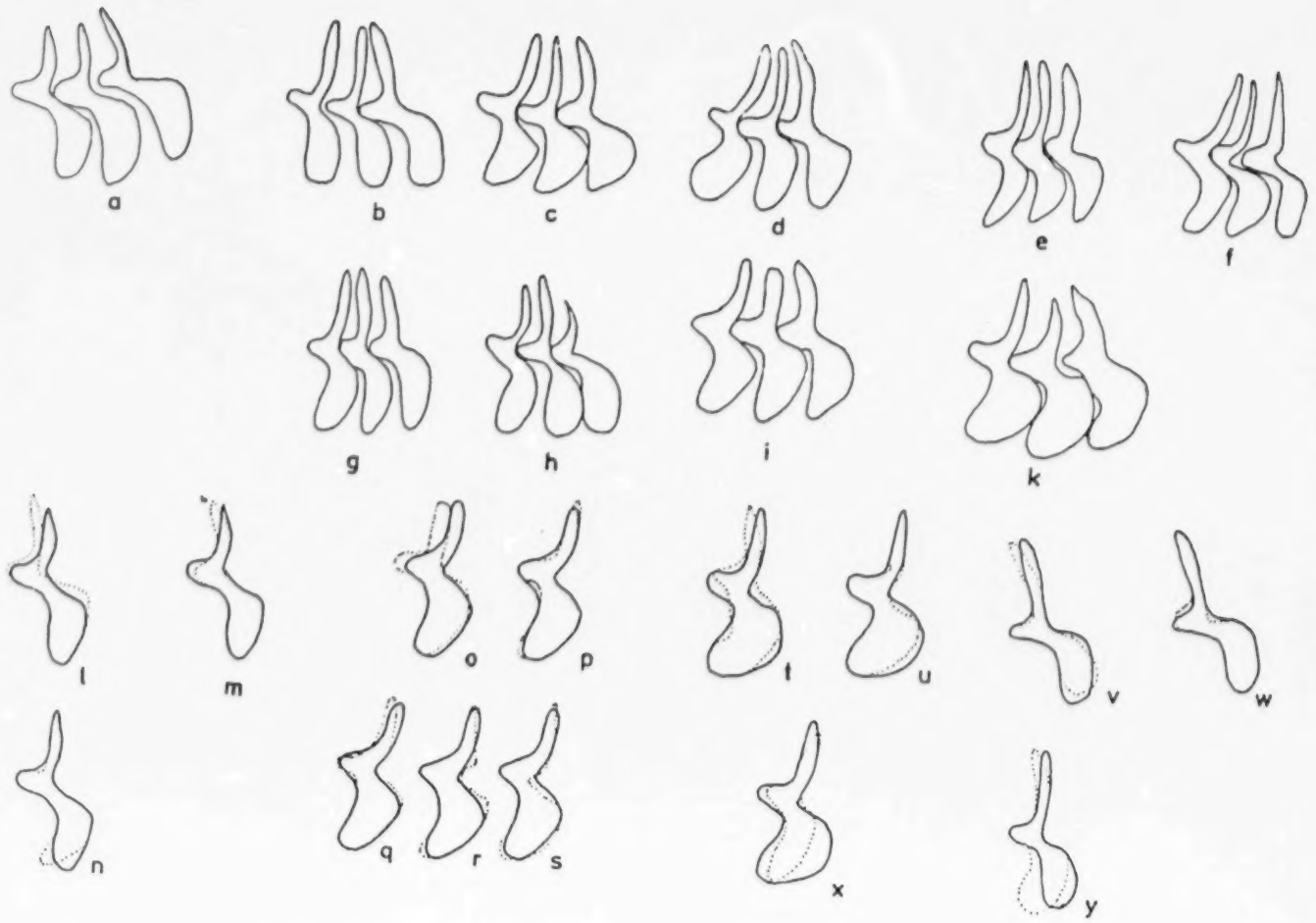
l-n. Comparison of a denticle of the type described by GRUPCHEVA et al. (solid lines) with denticles (broken lines) of: l. the same zooid, m. Trichodina nigra siluri (according to LOM 1970), n. Trichodina jiroveci (according to GRUPCHEVA et al. 1982)

o-s. Comparison of a denticle of type 1 from Leucaspius (1 i) with denticles of: o. the same zooid, p. Trichodina rostrata (according to LOM 1970), q. Trichodina modesta from Vimba vimba (according to LOM 1970), r. Trichodina modesta from Abramis brama (according to LOM 1970), s. Trichodina nigra nigra (according to ARTHUR & LOM 1984)

t-u. Comparison of a denticle of type 2 from Leucaspius (1 k) with denticles of: t. the same zooid, u. Trichodina nigra nigra (according to GOLEMANSKI et al. 1982)

v-w. Comparison of a denticle of type 1 from carp (1 b) with denticles of: v. the same zooid, w. Trichodina nigra nigra (according to LOM 1970)

x-y. Comparison of denticles of different zooids on x. Leucaspius (1 k and 1 g), y. Cyprinus carpio (1 b and 1 d).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## Discussion

I consider this comparison necessary, since the original descriptions do not permit definite recognition of these species.

As can be seen from the above report, the denticles of the adhesive disc in Trichodina can vary considerably in size and shape even in a single zooid, while they can be almost identical in different species, so that they alone do not suffice for species diagnosis. Of course, the differences given, e.g., by HAIDER (1964) to differentiate genera are still so large-- and yet without overlapping-- that they may be viewed as significant, just as the denticles, taken together with other criteria, can also be helpful in differentiating species.

In differentiating the genera Trichodina, Vauchomia and Semitrichodina, also the formation of the discal ciliature is used, so that species described only on the basis of the adhesive apparatus can not even definitely by assigned to a particular genus. These include the following species:

Trichodina anguilli WU, 1961 (Figure 2a)

Occurrence: gills of Anguilla anguilla

Measurements:

diameter of the body: 40-45 µm

adhesive disc: 23-28 µm

denticulate ring: 14-15 µm

number of denticles: 20-22

thorn: 2.5 µm

blade: 3 µm

central part: 1.5-1.7 µm

Trichodina borokensis ARTHUR & LOM, 1984 (Figure 2b)

Occurrence: gills of Pelecus cultratus

Measurements:

diameter of the body: 55.6-71.4 µm

adhesive disc: 43.3-54.6 µm

denticulate ring: 26.5-34.2 µm

number of denticles: 24-28

thorn: 5.6-7.6 µm

blade: 5.6-7.6 µm

central part: 1.5-3.1 µm

Trichodina izyumovae ARTHUR & LOM, 1984 (Figure 2c)

Occurrence: gills of Leuciscus idus

Measurements:

diameter of the body: 66.3-84.7 µm

adhesive disc: 52.5-68.8 µm

denticulate ring: 29.6-41.3 µm

number of denticles: 29-32

thorn: 7.1-10.2 µm

blade: 7.1-9.2 µm

central part: 1.5-2.6 µm

Trichodina jiroveci GRUPCHEVA & LOM, 1980 (Figure 2d)

Occurrence: gills of Gobius fluviatilis

Measurements:

diameter of the body: 40-56 µm

adhesive disc: 29-35 µm

denticulate ring: 19-23 µm

number of denticles: 24-27

thorn: 3.4-4.3 µm

blade: 3.4-4.3 µm

central part: 1.5-1.9 µm

Trichodina kupermanni ARTHUR & LOM, 1984 (Figure 2e)

Occurrence: gills of Abramis ballerus

Measurements:

diameter of the body: 37.7-64.8 µm

adhesive disc: 29.1-43.9 µm

denticulate ring: 18.4-27.5 µm

number of denticles: 20-28

thorn: 3.6-7.1 µm

blade: 4.1-5.6 µm

central part: 1-2 µm

Trichodina modesta LOM, 1970 (Figure 2f)

Occurrence: gills of Vimba vimba and Abramis brama

Measurements:

diameter of the body: 34-56 µm

adhesive disc: 25-43 µm

denticulate ring: 13-20 µm

number of denticles: 21-25

thorn: 3-4 µm

blade: 3.5-4.5 μm

central part: 1.5 μm

Trichodina mutabilis KAZUMBSKI, 1968 (Figure 2g)

Occurrence: skin and gills of Cyprinus carpio, Leucaspis delineatus, Carassius auratus, Scardinius erythrophthalamus, Pelecus cultratus, and Rhodeus sericeus amarus

Measurements:

diameter of the body: 60-106 μm

adhesive disc: 30-71 μm

denticulate ring: 19-50 μm

number of denticles: 22-36

thorn: 6-9 μm

blade: 5-10 μm

central part: 2.5-3 μm

Trichodina nigra LOM, 1961 (Figure 2 h)

Subspecies: T. nigra nigra, T. nigra gobii, T. nigra siluri, T. nigra luciopercae

Occurrence: skin and gills of Carassius auratus, Cyprinus carpio, Rutilus rutilus, Abramis ballerus, Perca fluviatilis, Aspro zingei, Pelecus cultratus, Nandus nandus, Tilapia mossambica, Silurus glanis (siluri), Gobio gobio (gobii) and Stizostedion lucioperca (luciopercae)

Measurements:

diameter of the body: 41-95 μm

adhesive disc: 24-54 μm

denticulate ring: 16.6-39 μm

number of denticles: 20-29

thorn: 2.2-7 µm

blade: 3.3-7 µm

central part: 1.1-3.3 µm

Size variations are found in all subspecies. Adoral spiral usually 360-380° (MUKHERJEE & HALDAR 1982).

Trichodina ophiocephalus KOSTENKO & KAREV, 1976 (Figure 2 i)

Occurrence: gills of Ophiocephalus argus warpachowskii and Abramis ballerus

Measurements:

diameter of the body: 54 µm

adhesive disc: 43 µm

denticulate ring: 28 µm

number of denticles: 55

thorn: 4.6 µm

blade: 5.1 µm

central part: 1.5 µm

Trichodina percae KASHKOVSKY & LOM, 1979 (Figure 2 k)

Occurrence: gills of Perca fluviatilis

Measurements:

diameter of the body: 61-86 µm

adhesive disc: 42-64 µm

denticulate ring: 24-40 µm

number of denticles: 22-25

thorn: 3.7-6.7 µm

blade: 6-9 µm

central part: 1.4-3 µm

Adoral spiral: 390-410°.

Trichodina perforata LOM, GOLEMANSKY & GRUPCHEVA, 1976 (Figure 21)

Occurrence: Gobio kessleri, Gobio albipinnatus, Alburnus alburnus

Measurements not given in GOLEMANSKY et al. The perforation of the denticles is supposedly characteristic of this species. Similar formations can be found also in Paratrichodina corlissi.

Trichodina prowazeci GRUPCHEVA & LOM, 1980 (Figure 2m)

Occurrence: gills of Rutilus rutilus

Measurements:

diameter of the body: 50-82 µm

adhesive disc: 39-55 µm

denticulate ring: 26-34 µm

number of denticles: 22-24

thorn: 4.8-8.6 µm

blade: 3.8-6.3 µm

central part: 1.5-2.4 µm

Trichodina rostrata KULEMINA, 1968 (Figure 2n)

Occurrence: skin and fins of Rhodeus sericeus

Measurements:

diameter of the body: 54-67 µm

adhesive disc: 44-55 µm

denticulate ring: 28-41 µm

number of denticles: 26-28

thorn: 7 µm

blade: 8 µm

central part: 3 µm

Trichodina tisae LOM, 1970 (Figure 2 o)

Occurrence: gills of Stizostedion lucioperca

Measurements:

diameter of the body: 48-57 µm

adhesive disc: 40-45 µm

denticulate ring: 26-30 µm

number of denticles: 23-27

thorn: 5-5.5 µm

blade: 4.5 µm

central part: 1.5 µm

Trichodina wellborni LOM, 1970 (Figure 2 p)

Occurrence: gills of Micropterus salmonides

Measurements:

diameter of the body: 44-58 µm

adhesive disc: 36-46 µm

denticulate ring: 20-29 µm

number of denticles: 21-26

thorn: 4.5 µm

blade: 5 µm

central part: 3 µm

Trichodina valkanovi GRUPCHEVA & LOM, 1980 (Figure 2 q)

Occurrence: gills of Rhodeus sericeus amarus

Measurements:

diameter of the body: 57-87 µm

adhesive disc: 38-53 µm

denticulate ring: 26-32 µm

number of denticles: 26-29

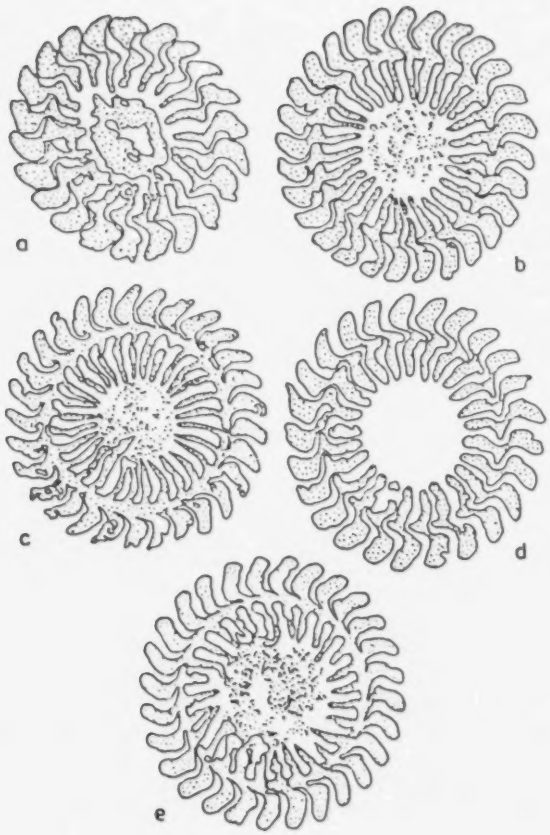
thorn: 4.3-8.6 µm

blade: 4.3-4.8 µm

central part: 1.7-1.9 µm

Figure 2. Denticulate rings, drawn from photographs of various authors.

a. Trichodina anguilli from LOM (1970)
b. Trichodina borokensis from ARTHUR & LOM (1984)
c. Tr. izyumovae from ARTHUR & LOM (1984)
d. Tr. jiroveci from GRUPCHEVA et al. (1982)
e. Tr. kupermani from ARTHUR & LOM (1984)
f. Tr. modesta from LOM (1970), from Vimba vimba (f1) and Abramis brama (f2)
g. Tr. mutabilis from LOM (1970), from Leucaspis delineatus (g1) and Carassius auratus (g2)
h. Tr. nigra from LOM (1961), subsp. gobio (h1), luciopercae (h2), nigra (h3), siluri (h4)
i. Tr. ophiocephalus from ARTHUR & LOM (1984)
k. Tr. percae from KASHKOVSKY & LOM (1979)
l. Tr. perforata from GOLEMANSKI et al. (1982)
m. Tr. prowazeki from ARTHUR & LOM (1984)
n. Tr. rostrata, n1 from LOM (1970) and n2 from KULEMINA (1968)
o. Tr. tisae from LOM (1970)
p. Tr. wellborni from LOM (1970)
q. Tr. valkanovi from GRUPCHEVA & LOM (1980)
r. Semitrichodina genitalis from SIRGEL (1983), r1 circlet of cilia, r2 denticle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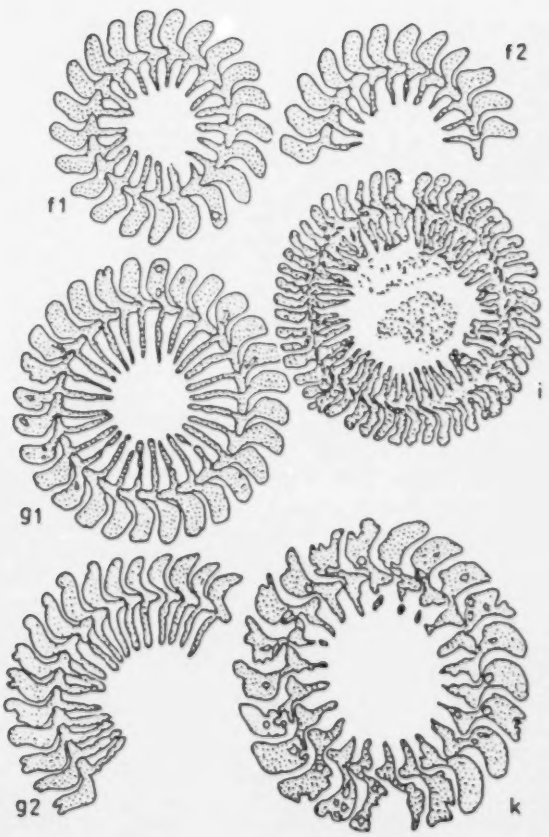
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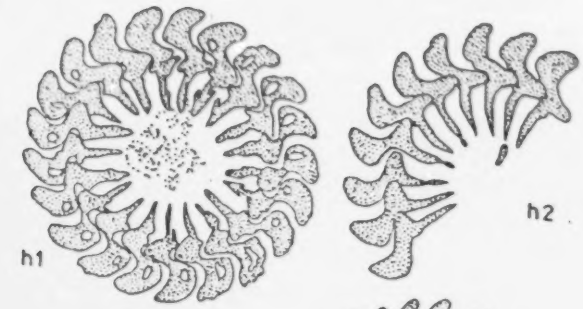
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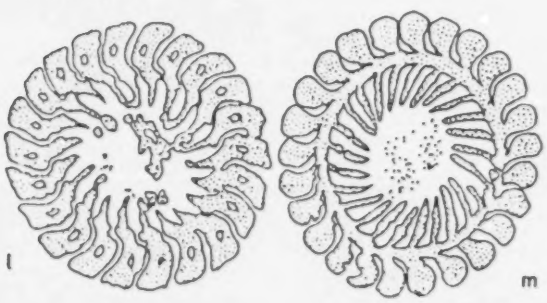
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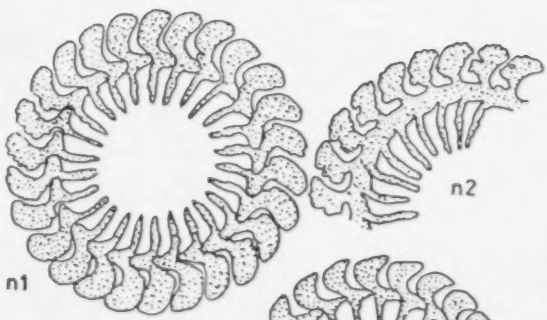
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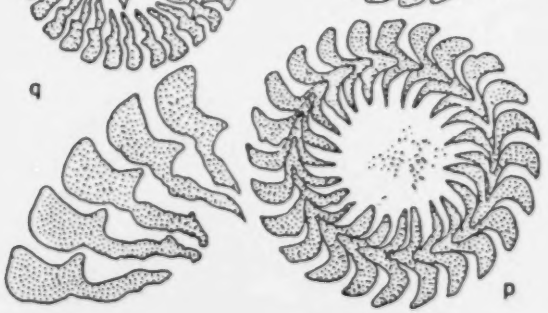
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Other trichodinid forms which have been only partially described can be grouped according to STEIN (1982), and belong to Semitrichodina incisa (LOM, 1959), HAIDER, 1964:

*Tripartiella incisa* LOM, 1959
*Paratrichodina incisa* LOM, 1963
*Tripartiella lata* LOM, 1963
*Tripartiella obtusa* ERGENS & LOM, 1970
*Paratrichodina corlissi* LOM & HALDAR, 1977
*Paratrichodina voikarensis* KASHKOVSKY & LOM, 1979

and also a form which can not be differentiated from the last of these, viz., Paratrichodina uralensis KASHKOVSKY & LOM, 1979.

A Semitrichodina from land snails is described-- again, very incompletely-- by SIRGEL (1983) as a new genus with two species: Trichodoxa genitalis and Trichodoxa phalli.

If indeed this is a new species (which is not clear from the inadequate description), it should be called:
Semitrichodina genitalis (SIRGEL, 1983) nov. comb. (Figure 2r)
Synonyma: Trichodina genitalis SIRGEL, 1983
Trichodina phalli SIRGEL, 1983
Occurrence: penis of Trachycystis ssp.
Measurements:

diameter of the body: 51-102 µm
adhesive disc: 33-72 µm
denticulate ring: 13-39 µm
number of denticles: 12-39
thorn: 5 µm

blade: 5-7 µm

central part: 2.25-3 µm

## [German] Summary

Description of only one morphological detail, such as the denticulate ring, is not sufficient for a species diagnosis in the case of Urceolariidae. It has been shown that denticles exhibit considerable intraspecific variation, but can be much alike in different species. Freshwater trichodinid species are cited which have been described almost exclusively on the basis of the denticulate rings, and therefore inadequately.

## Bibliography

ARTHUR, J. R., & LOM, J. (1984): Trichodinid Protozoa (Ciliophora: Peritrichida) from freshwater fishes of Rybinsk Reservoir, USSR. J. Protozool. 31: 82–91.

GOLEMANSKY, V. G., GRUPCHEVA, G. J., LOM, J., & DYKOVA, J. (1982): Parasites unicellulaires des poissons du secteur bulgare de Danube. Acta zool. bulg. 20: 3–12.

GRUPCHEVA, G. J., & LOM, J. (1980): Protozoan parasites of fishes from Bulgaria. I. *Glugea lucioperciae* and the description of three new *Trichodina* species. Folia Parasitol. (Praha) 27: 289–294.

GOLEMANSKY, V. G., & LOM, J. (1982): Nouvelles observations sur la faune et la répartition des parasites unicellulaires des poissons en Bulgarie. Acta zool. bulg. 20: 13–23.

HAIDER, G. (1964): Monographie der Familie Urceolariidae (Ciliata, Pertricha Mobilia) mit besonderer Berücksichtigung der im süddeutschen Raum vorkommenden Arten. Parasitol. Schriftenreihe 17. Jena.

KASHOVSKY, V. V., & LOM, J. (1979): New species of parasitic Ciliata of the family Urceolariidae. Parazitologiya 13: 266–268.

KAZUBSKI, S. L., & MIGALA, K. (1968): Urceolariidae from breeding carp – *Cyprinus carpio* L. in Zabiniec and remarks on the seasonal variability in trichodinids. Acta Protozool. 6: 137–160.

KOSTENKO, S. M., & KARAEV, R. M. (1976): Urceolariids (Peritricha, Mobilia) of fishes of Chimkurgansk water resevoir (Uzbekistan) with description of a new species, *Trichodina ophiocephalus*. Sb. Tr. Zool. Muz. Inst. Zool. Akad. Nauk, Ukrain. SSR 36: 17–24.

KULEMINA, I. V. (1968): Parasitic ciliates (Peritricha, Urceolariidae) from the fry and young fishes of Lake Seliger. Acta Protozool. 6: 185–206.

Lom, J. (1959): On the systematics of the genus *Trichodinella* Sramek-Husek (= *Brachyspira* Raabe). Acta Parasitol. Polon. 7: 573–590.

– (1961): Ectoparasitic trichodinids from freshwater fish in Czechoslovakia. Vestn. Cesk. Spol. Zool. 25: 215–228.

– (1963): The ciliates of the family Urceolariidae inhabiting gills of fishes (the *Trichodinella*-group). Vestn. Cesk. Spol. Zool. 27: 7–19.

– (1970): Observations on trichodinid ciliates from freshwater fishes. Arch. Protistenkd. 112: 153–177.

– Golemansky, V. G., & Grupcheva, G. J. (1976): Protozoan parasites of carp (*Cyprinus carpio* L.): a comparative study of their occurrence in Bulgaria and Czechoslovakia with description of *Trichodina perforata* n. sp. Folia Parasitol. (Praha), 23: 289–300.

Mukherjee, M., & Haldar, D. P. (1982): Observations on the urceolariid Ciliates of the genera *Trichodina* and *Tripartiella* in freshwater Teleosts. Arch. Protistenkd. 126: 419–426.

Sirgel, W. F. (1983): A new ciliate genus *Trichodoxa* n. g. (Ciliata, Peritricha, Mobilina, Trichodinidae) with two new species from the genital system of terrestrial Pulmonates. J. Protozool. 30: 118–125.

Stein, G. A. (1982): Parasitic ciliates (Peritrichida, Trichodinidae) of some fishes of the Kurish Gulf. Parazitologiya 16: 24–29.

## Translation of non-English titles

**1. Unicellular parasites from fish of the Bulgarian sector of the Danube**

**2. New observations on the fauna and distribution of the unicellular parasites of fish in Bulgaria**

**3. Monograph on the family Urceolariidae (Ciliata, Peritricha mobilia), with special consideration of the species found in the area of southern Germany**

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